Status Report January 2008

A Status Report on Alternatives

for Fish Restoration and Green Power

at the

Kilarc – South Cow Hydropower Project

A Discussion Document

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Forward: Fish Restoration and Green Power
The Issues at Cow Creek

Davis Hydro published a working document, dated September 20, 2007 that focused on one main issue: what is the best way to protect Central Valley steelhead fish in Cow Creek? The document describes the KC alternative to the removal of facilities that PG&E has declined to re-license for hydroelectric generation. It has evolved to the present proposed alternative that will increase fish habitat and fish anadromy in the Cow Creek area. The proposed physical and management improvements are intended to produce many thousands of salmon and rainbow more than what will occur naturally. The current proposal (available on www.Kilarc.info) still retains much of the existing hydroelectric generation, but reflects revisions to the original assumptions that have evolved as biologists have contributed new information and insights. The fish habitat and anadromy improvements can be supported with oversight, financial support, and hands-on management from hydropower operations as a condition of any future license.

This paper, like the last, continues to raise issues that must be addressed as we work with the community and other concerned parties to formulate a path that best serves the resource and stakeholders. The David Hydro **Alternative I** is designed to address biological issues, as well as the recreational, water supply, and other objectives of all interested parties. It is an environmentally responsible alternative that may save PG&E (and all of us) a lot of money.

1. **The Kilarc Spawning Channel**. The Kilarc Diversion canal is full of fish of all types. It can be considered prime spawning fish habitat with some minor modifications for rainbow/steelhead.

2. **The South Cow Spawning Channel**. The South Cow Creek has a similar but smaller canal, and by moving the diversion screen down to the forebay and installing a fish bypass we can spawn and return juveniles and migrating adults down to the Creek.

3. **The Abbott Ditch Spawning Channel and Management**. If we can obtain cooperation of the ranchers, we intend to turn the first few hundred meters of the Abbott ditch into a fish spawning area and return migrating adults and all juveniles to the Creek.

4. **The German Ditch Spawning Channel**. If we can obtain cooperation of the ditch water rights holders, we would likewise put a screen in the ditch and maintain approximately the first quarter mile as a fish hatchery. This would be maintained actively.

5. **The Hooten Gulch Salmon and Steelhead Juvenile Habitat.** In cooperation with local land owners we can create and maintain a juvenile habitat in the South Cow tailrace and the Hooten gulch down to where it joins the South Cow with a steady supply of cold water.

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Current Understanding of Fish Restoration Issues to be Addressed

This following paper represents some ideas for discussion. Some of them are controversial. Some of them are new, and some of them may be incorrect. In order to move forward, these ideas are presented to see if they resonate with the observations of others on wildlife in this area.

Background

Davis Hydro has taken up the challenge of preserving Kilarc Reservoir and other features of the FERC-licensed hydroelectric project 606 Kilarc-Cow Creek Project for the benefit of the fish, the environment, and renewable energy. The Kilarc Cow Creek License surrender process had been underway for several years. This process had proceeded to the point that the Resource Agencies and PG&E had agreed to remove the facilities from Kilarc and the South Cow Creek thinking that that was the best way to restore anadromous fish to the area. The streams are of special interest in that there are no dams between this hydro project and the Pacific Ocean. The South Cow has Steelhead trout and winter run salmon. The Old Cow Creek part of the facility might have potential for steelhead, as some rainbow are observed along the length of the Creek and throughout Kilarc facility which bypasses part of the Old Cow. Both species are listed by the state and Federal Government as either endangered or threatened.

Davis Hydro has examined the site, conferred with the agencies and many of the local stakeholders, and concluded that this small hydro facility could be saved and redesigned to produce more fish than if the facilities were removed. While there are numerous issues in the surrender, the key issue is the fish[1] and how to best restore them.

Appendix I to this progress report contains further background discussion points related to the PG&E-Agency Agreement and Kilarc Area physical observations. Extensive documentation on the whole process to date is available in the Documents and Reference Section of www.Kilarc.info . Further information on the resource studies commissioned by PG&E and their decommissioning plan is available from PG&E at www.kilarccowcreek.com.

Current Baseline Issues

The following sections highlight different aspects of the PG&E-proposed abandonment that need to be addressed by stakeholders. They are discussed here because they bear on a possible solution to the question of what is the best way to enhance fish and generation of renewable energy in this area. The following is our perspective on the issues and opportunities as of January 2008. We, like everyone else, are new to the process of a utility abandoning a source of green power, so many of the concerns listed below may be

[1] The word "fish" is used from here on to refer to the anadromous trout and salmon that are, or reasonably could be, resident in this area, notably Steelhead Trout and late fall or winter run Salmon.

inaccurate or incomplete. They are raised here for discussion and possibly needed study. The fears raised by stakeholders must be dealt with honestly by all parties, or dismissed.

Physical Issues Associated with Abandonment of Project Facilities

The perspective reflected in PG&E's proposal to dismantle the hydro project facilities assumes that the removal of infrastructure will have a net beneficial effect on anadromous fish, and that any adverse effects on other resource values can be mitigated. An alternative view is that anadromous fish may actually benefit more from retention of modified facilities, and that by continued operation other adverse effects of facility removal may be simultaneously avoided. This evaluation is the reversal of a new facility. Here the animals, including man and fish, have fully adapted to the hydro facilities, which are producing beneficial green power. The question is the change in environmental balance of removing this already established green power source.

The issue of evaluating alternatives is complex, in that like the wild animals in the area, man has adapted to the presence of the Kilarc Cow Creek (KCC) facilities. Just as the fish, frogs, birds and a near infinite number of others have adapted to the KCC environment, man has built a town in this area that is dependent on the KCC facilities for fire protection in a major way, on income in maintenance of the facilities, on the recreation it provides, and to some small extent on business from incoming fishermen to the area.

Removal of these facilities is not just a local cultural and environmental question, but also impacts the value of property, business and lives of the people living in the area. Just as we are concerned about some of the species because of their federal endangerment, such as anadromous fish, we must equally consider the larger regional impacts of replacing this renewable power source with fossil energy and its attendant pollution. When evaluating the alternatives, these impacts should also be considered.

Whitmore Fire Protection

A community has grown up in the past 100 years within a forest directly below the Kilarc reservoir. This forest burns on a regular basis, and possibly the only reason the town is still there is that the fires can be fought with the waters from this reservoir. The Kilarc reservoir is an important element for this community's fire protection for two reasons, its proximity and its altitude. Its closeness to the community means that water can be proved quickly to the town. Almost as important is the element of gravity. A helicopter is limited in its flight time and the amount of work possible with a tank of fuel. If it is bringing water down hill, it uses much less fuel and time than if it has to fly uphill with a heavy load of water. Thus, the elevation of the Kilarc reservoir combined with its proximity is a major asset for the town, and to a certain extent is the reason the town is still standing.

Fish

Anadromous Fish: Small hydro, with its associated diversions and bypassed streams, is generally considered bad for fish, and in particular, for anadromous fish which must pass

up and down stream to reproduce. The National Marine Fisheries Service believes that the natural conditions are the best for anadromous fish.

In the Kilarc Cow Creek Diversions, this may not be true. Both hydropower facilities have the ability to be converted, at low cost, to two spawning channels, and parts of the South Cow facility will make a large spawning habitat and juvenile habitat. The hydropower licensee can be required to maintain these channels and habitats for the benefit of the fish. Removal of the facility will "Take", in ESA parlance, the fish that could benefit from this habitat as it is or could be with minor engineering modifications. Since the diversion canals can easily be made into spawning grounds, the baseline for removal must be the fish that can exist in the current environment. Separately, parts of the hydropower facilities have become critical habitat for various endangered species and must be maintained.

Trout Fishing: The Kilarc area is one of the finest trout fishing areas in northern California. It has by far the nicest venue with views of three of the highest mountain ranges in the state from casting locations. The handicapped fishing is therefore unequaled in the state with the informal simplicity and beauty of the site and the plentiful fish to be caught. Since there are no comparable facilities in the state, mitigation may not be possible.

Endangered Species

The Steelhead Trout and the Winter Run Salmon are listed as threatened or endangered. In addition, there are endangered frogs in the tailrace area of the South Cow project. There may be additional endangered species that have moved into the forebays and along the canals that are still unnoticed, due to seasonal sampling.

Water Supply and Diversion Issues

It is claimed that various properties receive their water indirectly or directly from project facilities: water from the Kilarc forebay may recharge groundwater, flows allocated to PG&E may be essential to the German Ditch delivery system, and the adjudicated Abbott Ditch diversion has been replaced by delivery dependent on the hydropower water conveyance.

A key provision of the PG&E and Resource agency's "Agreement" is the turning of PG&E's ditch water back to the stream for the fish. Unfortunately, other people have come to count on that water in various ways, and now it is not clear if, or how, agency, community and PG&E objectives can be reconciled. The integrated delivery of water to diversion rights holders and the hydro project is another example where people have come to depend on these facilities after many years. As with the fire issue, people have built houses depending on this water being available.

Acid Rain and Green Power Issues

Due to the strong demand for renewable power in California, all available renewable power is being developed as rapidly as conditions allow. This means that any destruction of renewable green power facilities resulting from the PG&E-Agency agreement will

make up the loss of power by 100 % hydrocarbon based energy. While this puts the natural resource agencies in the position of destroying an already constructed source of green electricity, it has the further effect of impacting negatively many millions of fish. The increase in carbon-based emission from coal and carbon based fuels to make up for this loss of green power will produce acid rains that will blow across the US with the prevailing westerly winds. The acidifying effects of these rains on the fish populations in California and to the East will be small in any one place, but the effects occur in all downwind areas to the east of Whitmore. The combined effect of these acids, irrespective of the compounding effects of global temperature rise, will slightly diminish many fish populations to the East and incrementally around the world.

It could be argued that the small effect will be unnoticeable and untraceable in any one river or pond. While this is true, the calculus of integration of all the acid rain and other pollution diminishes habitat quality over a huge national and international range; the deleterious effect on the total number of fish is enormous. The acid rain from making up for the energy lost from Kilarc will be incremental nationally in exactly the same way that the perceived contribution to endangered fish will be improved incrementally by improving habitat at Old and South Cow Creeks.

This is the NIMBY effect in reverse; utility and agencies are focusing on one small facility, while ignoring the fact that emissions resulting from changes in facility operation are connected to our whole environment. To measure the effects of the destruction of green power sources, we have to consider the destruction of environment and fish habitat that will result from removing these facilities. This is not an indirect action. Incremental habitat destruction is a direct consequence of the actions considered here and has to be accounted for. National agencies should do national impact accounting, and state agencies should look at the effect of these acid rains on the poorly buffered waters to the north and east of the project. Acidification of these waters is already serious. Destruction of green power facilities such as this will only make the problem worse.

Process Issues

The term “process issues” refers to compliance requirements of state and federal laws designed to protect the environment. Davis Hydro pretends no expertise in these issues and processes, so the list below is undoubtedly incomplete and perhaps inaccurate. Any errors are regretted.

Clean Water Act

The Clean Water Act requires wetland habitat maintenance or mitigation for its loss.

The Kilarc Canal and Forebay Habitat and its resident populations may require mitigation for abandonment, such as the establishment of some similar wetland at a similar altitude, fish fertility as presently exists in the canal, and compensation for loss of the forebay which is full of birds and possibly other animals dependent on the populations found in the wetland.

The South Cow Canal, Forebay, and Tailwater Habitats have reasonable stretches of area that are wetlands. The South Cow forebay is a large impoundment that has gentle sides and a large amount of habitat for fish, amphibians, mammals, and birds. Its remoteness from human population makes it an attractive watering hole, and since it is maintained at a fairly constant head, the habitat is diverse and healthy.

Endangered Species Act/California Endangered Species Act

Federally authorized projects must incorporate measures that prevent "Take" – net harm to individuals or habitat – of species listed for protection under the federal Endangered Species Act. The following sections address possible application of this law to different areas.

Kilarc/Old Cow Area

Since there are known populations of rainbow trout above the PG&E diversion on the Old Cow and there is no screening at the diversion, the whole canal and forebay have become prime steelhead habitat from upstream seeding.

Adult fish can presently go downstream through the division overflow. However, at present juveniles are killed in the turbines. Since this canal has become prime steelhead habitat, the law dictates that it should not be allowed to be destroyed without mitigation. It might be argued that the return of the water to the bypass reach of the Old Cow is preferable to water in the diversion canal, however the NEPA analysis might consider the following facts that work against that conclusion:

- The Old Cow channel is narrow and steep, and u- or v-shaped in substantial sections. This creates poor, high-velocity habitat that worsens with increased flow. In view of this, the optimal flow in the Old Cow may not be much above the current releases – but how much above needs to be tested.

- The Old Cow is subject to flash flooding which has the effect of disrupting any residency, redds, and destroying new habitat.

- The Old Cow has several cascade barriers which preclude upward migration of fish except in exceptional circumstances.

The Kilarc Canal can become a prime spawning habitat with minor modifications. A fish screen at its end and a fish bypass pipe can be constructed to return fish to the Old Cow. All juveniles can be returned to the existing Old Cow channel into the lower areas of the Old Cow above the powerhouse where some juvenile habitat might exist.

For these reasons and possibly others, many more anadromous fish can exist in the Kilarc canal than in the bypassed section of the Old Cow. To remove the Kilarc Canal would cause a large loss of potential migrants and the destruction of a large amount of useful habitat for steelhead. However, it is clear that mitigation is not permitted under Section 7 of the ESA for federal projects such as this. Thus, since the procedures for evaluating alternatives under NEPA are the same for a new license, abandonment of the flows in the

Kilarc Canal might not be permitted unless it can be shown that there will be no net "Take" of the fish within a proposed alternative. While some groups may believe that removing the Kilarc Diversion dam and returning the bypassed waters to the Old Cow Channel is the best source of action for the fish, this might not be true, due to the factors outlined above.

South Cow

One visit to the South Cow forebay makes it very clear that the whole area is filled with wildlife. This wetland, along with some parts of the South Cow diversion canal, could be extremely rich habitat. If the diversion screen were moved down to the end of the canal and a fish return were installed, parts of the headrace canal would provide habitat for target fish.

The tailrace down, including parts of channels of the South Cow, can also be modified at little cost to provide prime salmon and steelhead spawning grounds using resources generated by the hydropower. The loss of this opportunity to protect an expanded population of endangered fish should be discouraged.

Federal and State Air Quality Standards

The coal, oil, and natural gas that will be burned to make up for the loss of green generation will have a negative effect not only through the acid rain on fish but a wider effect through air pollution. These point-source emissions result directly from any diminution of green energy from this site. If state agencies are looking at California state-wide effects of small actions, then these agencies should consider statewide effects of destroying green energy. Likewise, if Federal agencies have standing on local dam decisions, it is because local decisions have national effects on fish populations and our environment. The state agencies are charged with taking a state-wide perspective and the national agencies have to look at national effects. If they do not take these broader perspectives, they have little business in local affairs.

NEPA Process

Before approving PG&E's license surrender, the FERC will undertake an analysis of the environmental effects of the specific license surrender plan that is proposed by PG&E. The NEPA FERC process requires the consideration of these alternatives. These alternatives must include all those that are reasonable, including, classically, the no-build/no-change alternative. FERC will be looking with a national perspective on any change in renewable energy, which it is charged with promoting, as well as the national environmental consequences of its replacement.

"The Agreement"

The Agreement was signed between PG&E and the Resource agencies to the effect that the project should be removed, not because it was necessarily the best alternative, but perhaps because it was the only alternative presented. This agreement appears to act like a "letter of intent" or a proposed agreement. By itself, the document has no legal status, has not been reviewed publicly, and does not fit perfectly into the FERC/NEPA process.

It does, however, follow FERC's numerous suggestions of working out agreements among parties outside of the FERC/NEPA process.

Davis Hydro was not around at the time, nor were they knowledgeable of the plans to remove the project. The Agreement was nearly a private affair. One could look at the agreement as the result of FERC-induced discussions between an applicant and Review/Resource agencies prior to a NEPA process by the FERC. In this manner, the Agreement was considered as a starting point for all parties to show that they have discussed the ideas and options among themselves prior to going to the FERC. This is exactly the procedure recommended by the FERC.

An in situ *Mitigation*

To maintain critical habitat under ESA, reasonable measures can be taken. Building a diversion in the quiet canal and a long unpressurized fish pipe bypass are reasonable. If a fish bypass were constructed from the end of the Kilarc canal and screened from the forebay, it could safely conduct adult migrants and juveniles down to a feeder creek on the south side of the Old Cow, assuring the benefits of the whole Kilarc canal and using the most useful part of the Old Cow bypass reach. This lower area would retain a reduced flow similar to its current state, with cold water coming in from numerous springs and North Canyon as well as the conduit water proposed.

Because the Kilarc canal can be classified as *critical habitat* due to its excellence as a potential steelhead spawning ground, it is going to be difficult to show that substituting the inferior habitat of the uncontrolled Old Cow will provide anything but a significant fish loss.

Included in PG&E's surrender plan was an agreement to carry out the necessary studies during 2007 and 2008 to support a surrender plan. We recommend that all reasonable alternatives be studied for the benefit of the fish, and that they be completed quickly.

Alternatives

The NEPA process requires the study of alternatives. Two are discussed here.

PG&E's Removal Alternative

This is the alternative put on the table by PG&E after they evaluated the project under the constraints as they saw them at the time. The idea to remove the hydro project was tentatively accepted by the agencies in a letter of agreement, referenced above. The removal alternative appears to have the following effects:

1. The increase in flows in the South Cow and Old Cow bypass regions will cause some increase in productivity in these areas from new habitat. The amount can be determined from study of the area.

2. In the Kilarc area, the decrease in flow through the diversion will raise water temperatures downstream of the powerhouse negatively, impacting salmon and

steelhead habitat. The extent of this can be estimated from data gathered from simple intervention studies in which water is turned on and off for a period during which the effects are observed.

3. Elimination of the possibility of using the Kilarc and South Cow headraces as fish habitat using fish bypasses.

4. Eliminate the possibility of using South Cow Tailrace and lower Hooten Gulch as spawning and rearing habitats.

5. Destroy significant ancillary wetlands habitats such as the forebays.

6. Have negative impacts on community recreation, income, and fire protection for Whitmore and ranchers on the South Cow.

7. Make supplying water to the Abbott ditch more difficult.

8. Unilaterally backing out of the "agreement" by offering to surrender the ditch diversion rights. This water was promised for in-stream fish releases to the agencies. Since these ditches can now divert more water than is sometimes in the stream, leaving water for fish passage and habitat maintenance is an important element in the agreement.

An extensive description of this alternative is available in the Documents section of www.Kilarc.info and on the PG&E website www.Kilarccowcreek.com .

Davis Hydro Alternative 1

Alternative I is a complex of measures on the two diversions to keep some form of hydropower production. Reasonable measures can be taken to maintain and expand critical habitat under ESA. Specifically, we propose habitat enhancements divided into five zones as described in the document **Alternative I** available on www.Kilarc.info . The proposed alternative include, as a key element, building long fish screens in the downstream ends of the Kilarc and South Cow diversion canals close to the forebay ponds and returning a fish bypass flow from them to the bypassed channels.

These fish bypasses will enable the canals to be used as long spawning grounds for Steelhead and (in the South Cow) Steelhead and Salmon. Further, in the South Cow the plan is to expand the tailrace and Hooten Gulch with engineering improvements to create a long juvenile and spawning channel from near the powerhouse to well below the Abbott Ditch diversion.

Specifically, fish bypasses can be constructed from the end of the canals that would be screened from their forebays. These long fish bypasses will conduct adult migrants and juvenile down to rejoin the lower creeks. In the case of the Kilarc canal the bypass pipe will lead to a feeder creek on the south side of the Old Cow, safely assuring the benefits of the whole Kilarc canal and the lower, wettest part of the Old Cow bypass reach. This lower area would retain a reduced flow similar to its current state with water coming in from numerous springs and North Canyon as well as the conduit water proposed. On the south Cow, the bypass would lead down to the top of the tailrace that is being modified as a juvenile salmon and steelhead habitat.

This alternative is described in more detail on the home page of www.Kilarc.info, and in a companion document to this report called the Davis Hydro Alternative I.

Appendix I: Notes on the PG&E-Agency Agreement Background and Kilarc Area Physical Observations

There was a letter of agreement between PG&E and the regulatory agencies in which all signatories agreed to remove the PG&E Kilarc-Cow Creek Facilities (KCC), primarily because the re-licensing costs and perceived future operating conditions would have rendered the project uneconomical. The agreement is available as document KC0020 at http://kilarc.info/Docs_Maps_Drawings/Documents/docs.htm .

When the public discovered it, numerous people took exception, perceiving that removal was in the interest of neither the local or greater environment. These people included Richard Ely and Kelly Sackheim of Davis Hydro, Glenn Dye who formed the Save Kilarc Association, R. J. Roth, a.k.a. Whitmore Bob, and Diane Dressel, President of the Friends of Cow Creek Preserve (FoCCP), at the conclusion of the Board Meeting of the Cow Creek Watershed Management Group (CCWMG) in Palo Cedro. It was also severely questioned by Steve Tetrick and other ranchers and residents on the South Cow.

Notes on the "The Agreement"

- ≈ This action of removal was motivated entirely by PG&E.
- ≈ It was agreed to by the agencies to meet fisheries objectives based on the information that was available at the time. No other alternative was on the table.
- ≈ The Agreement was written outside of public view and process.
- ≈ The Agreement was made without any studies on what was best for the fish or what could be done for the fish given the present infrastructure, or the effects on the environment and fish of the loss of the renewable generation and its associated habitats.
- ≈ Fish-oriented agencies agreed to the destruction of the hydropower facilities because of the general rule that "natural conditions" are best for the fish.
- ≈ The Agreement was written before Davis Hydro became aware of the process or had opportunity to suggest alternatives.
- ≈ This agreement was well-intentioned and gave good guidance to FERC on what the agencies believed was the best course of action *at the time of signing*.

Kilarc Area Physical Observations

- ≈ On average, the Kilarc Facility can generate about 11 GHW per year of green power depending on rainfall, operations, and condition of the diversion.

- ≈ The Kilarc Facility has a bypass canal of approximately 3 miles, far longer than most small hydroplants.

Kilarc Area Fish: Focus on Rainbow/Steelhead

- ≈ Because of the elevation and physical impediments, anadromous fish other than rainbow/steelhead are not the species of concern in the Kilarc project area. The rainbows are of concern and are an Ecologically Significant Unit listed species.

- ≈ The rainbows are present throughout the area. They have been observed and documented above, below, and within the project facilities.

- ≈ Fish moving downstream are mostly caught in the diversion that is currently unscreened. It might be possible for some fish to pass upstream through the diversion gate, but this looks to be difficult to impossible at present. This might be modified.

- ≈ The Old Cow bypass reach is generally inaccessible and on private land. It is now also inaccessible to anglers above the bridge near the powerhouse.

- ≈ The Old Cow channel is often fairly narrow compared to the diversion canal, and seems to contain little stable habitat. With increased flows within the narrow U shaped channel, in many areas only a little additional habitat is created as the sides of the channel are steep. With increased flows, water velocity will often be too high for successful spawning.

- ≈ Occasional storms flush out a large percentage of the fish population in various life stages due to the steepness and narrowness of the Old Cow Channel in the bypass region.

- ≈ The Kilarc bypass moves high elevation water quickly to the powerhouse. This is faster and higher than through the Old Cow channel, so the resulting water temperature will generally be lower with the powerhouse operating than if it were down. This would be easy to test by cycling the powerhouse and observing the results over weekly cycles.

- ≈ In the winter, the water coming from the North and South Canyon area is often warmer than the surface water. This water is injected at the powerhouse, thereby very slightly raising the water temperature downstream of the powerhouse in the winter.